response profiles, and a comparison algorithm are provided. In another embodiment, the electrical measuring device is an integrated circuit comprising neural network-based hardware and a digital-analog converter (DAC) multiplexed to each sensor, or a plurality of DACs, each connected to different sensor(s).

[0043] A wide variety of analytes and fluids may be analyzed by the disclosed sensors, arrays and noses so long as the subject analyte is capable of generating a differential response across a plurality of sensors of the array. Analyte applications include broad ranges of chemical classes including, but not limited to, organics such as alkanes, alkenes, alkynes, dienes, alicyclic hydrocarbons, arenes, heterocyclics, alcohols, ethers, ketones, aldehydes, carbonyls, carbanions, polynuclear aromatics and derivatives of such organics, e.g., halide derivatives, etc., microorganism off-gases, fungi, bacteria, microbes, viruses, metabolites, biomolecules such as sugars, isoprenes and isoprenoids, fatty acids and derivatives, etc.

[0044] Accordingly, commercial applications of the sensors, arrays and noses include environmental toxicology and remediation, biomedicine, materials quality control, food and agricultural products monitoring. Further applications include, but are not limited to: heavy industrial manufacturing (automotive, aircraft, etc.), such as ambient air monitoring, worker protection, emissions control, and product quality-testing; oil/gas petrochemical applications, such as combustible gas detection, H_2S monitoring, and hazardous leak detection and identification; emergency response and law enforcement applications, such as illegal substance detection and identification, arson investigation, hazardous spill identification, enclosed space surveying, and explosives detection; utility and power applications, such as emissions monitoring and transformer fault detection; food/beverage/agriculture applications, such as freshness detection, fruit ripening control, fermentation process monitoring and control, flavor composition and identification, product quality and identification, and refrigerant and fumigant detection; cosmetic/perfume applications, such as fragrance formulation, product quality testing, and patent protection fingerprinting; chemical/plastics/pharmaceuticals applications, such as fugitive emission identification, leak detection, solvent recovery effectiveness, perimeter monitoring, and product quality testing; hazardous waste site applications, such as fugitive emission detection and identification, leak detection and identification, and perimeter monitoring; transportation applications, such as hazardous spill monitoring, refueling operations, shipping container inspection, and diesel/gasoline/aviation fuel identification; building/residential applications, such as natural gas detection, formaldehyde detection, smoke detection, automatic ventilation control (cooking, smoking, etc.), and air intake monitoring; hospital/medical applications, such as anesthesia and sterilization gas detection, infectious disease detection, breath, wound and body fluids analysis, and telesurgey.

[0045] In yet another aspect, the present invention relates to a method for detecting the presence of an analyte in a fluid comprising: providing a sensor array comprising first and second sensors, wherein the first sensor comprises a region of aligned conductive material; and contacting the sensor array with the analyte to produce a response thereby detecting the presence of the analyte. Preferably, the first and second sensors are first and second chemically sensitive resistors each comprising a plurality of alternating nonconductive regions, such as nonconductive organic material, and aligned conductive regions, such as an aligned conductive material compositionally different than the nonconductive region, each resistor providing an electrical path through the nonconducting region and aligned conductive region, a first response such as an electrical resistance, when contacted with a first fluid comprising an analyte at a first concentration and a second different response when contacted with a second fluid comprising the analyte at a second different concentration.

[0046] The general method for using the disclosed sensor arrays and electronic noses for detecting the presence of an analyte in a fluid preferably involves resistively sensing the presence of an analyte in a fluid with a chemical sensor comprising first and second conductive leads electrically coupled to and separated by a chemically sensitive resistor as described above by measuring a first resistance between the conductive leads when the resistor is contacted with a first fluid comprising an analyte at a first concentration and a second different resistance when the resistor is contacted with a second fluid comprising the analyte at a second different concentration.

[0047] In certain embodiments, the methods and systems of the present invention can be used for monitoring medical conditions and disease processes. For instance, WO 98/29563, published Jul. 9, 1998, and incorporated herein by reference, discloses a method for monitoring conditions in a patient wherein a sample is obtained from a patient over a period of time. The samples are then flowed over a gas sensor and a response is measured. Thereafter, the response is correlated with known responses for known conditions. The conditions include, but are not limited to, the progression and or regression of a disease state, bacterial infections, viral, fungal or parasitic infections, the effectiveness of a course of treatment and the progress of a healing process.

[0048] In another embodiment, the methods and systems of the present invention can be used for monitoring medical conditions in a respiring subject. For instance, WO 98/39470, published Sep. 11, 1998, and incorporated herein by reference, discloses a method for detecting the occurrence of a condition in a respiring subject. The method comprises introducing emitted respiratory gases to a gas sensing device, detecting certain species present in the gas and correlating the presence of the species with certain conditions. A wide variety of conditions can be ascertained using this aspect of the present invention. These conditions include, but are not limited to, halitosis, ketosis, yeast infections, gastrointestinal infections, diabetes, alcohol, phenylketonuria, pneumonia, and lung infections. Those of skill in the art will know of other conditions and diseases amenable to the methods and systems of the present invention.

[0049] In certain aspects, the sensor arrays, systems and methods of the present invention comprise: first and second sensors wherein the first sensor comprises a region of aligned conducting material. The second sensor can also comprise a region of aligned conductive material. However, in certain other embodiments, the second sensor is a different sensor type. Suitable sensor types include, but are not limited to, a surface acoustic wave (SAW) sensor; a quartz microbalance sensor; a conductive composite; a metal oxide gas sensor, an organic gas sensor; an infrared sensor; a